32514

VIA: AIR
SPECIFY AIR OR SEA POUCH

DISPATCH NO. [redacted]

25X1

~~SECRET~~
CLASSIFICATION

TO : Chief, KUCLUB

DATE: 01 JUN 1955

25X1

FROM : Chief, [redacted]

SUBJECT: GENERAL- Operational/Engineering
SPECIFIC- Soviet Transceiver "SABERU"

REFERENCES: (A) DIR 03055
(B) DIR 04684

DOC 04 REV DATE 1 MAY 1980 BY 018373
ORIG COMP 33 OPI 56 TYPE 10
ORIG CLASS S PAGES 25 REV CLASS
JUST NEXT REV AUTH: HR 1...

1. Enclosed is a technical report, with schematics and photographs, of a Soviet built transceiver [redacted]

25X1

2. We hope this will satisfy DIR 03055 - 04684 inasmuch as no spare units are available for shipment.

3. Two sets are presently [redacted] in this area and can be examined locally for any information not covered in this report.

25X1

25X1

for [redacted]

31 May 1955

Encl: Technical Report as noted

Dist: 3 - KUCLUB w/encl (1)
1 - [redacted]ps w/o encl
1 - [redacted]rono w/o encl

CH
FEB
EURB
MEMB
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25X1

FILE SB/Foreign Assets Control JUN 2 1955

# OFFICIAL RECORD COPY

~~SECRET~~ CONFIDENTIAL
CLASSIFICATION

FORM NO

UNCLASSIFIED CONFIDENTIAL SECRET

# ROUTING AND RECORD SHEET

CONFIDENTIAL 1955

**INSTRUCTIONS:** Officer designations should be used in the "TO" column. Under each comment a line should be drawn across sheet and each comment numbered to correspond with the number in the "TO" column. Each officer should initial (check mark insufficient) before further routing. This Routing and Record Sheet should be returned to Registry.

| FROM: OFFICE OF COMMUNICATIONS<br>ROOM 2020, BUILDING EYE | TELEPHONE | NO. [redacted] 1599 25X1 25X1<br>DATE 1 June 55 |
|---|---|---|

| TO | ROOM NO. | DATE REC'D | DATE FWD'D | OFFICER'S INITIALS | TELEPHONE | COMMENTS |
|---|---|---|---|---|---|---|
| 1. OC-O | | 24 June | JUL 13 55 | | | ACTION |
| 2. OC-E | | | | | | |
| 3. ~~OC-O~~ | | Return w/ attachment for file | | | | |
| 4. R/D | | | 7/6 [illegible] | | | |
| 5. | | | | | | Haggle with OC-O on who should file this. There seems to have been some thought given to the [redacted] 25X1 antenna particularly (Long would approve the "V Beam", no doubt). |
| 6. | | | | | | |
| 7. | | | | | | |
| 8. | | | | | | |
| 9. | | | | | | |
| 10. | | | | | | |
| 11. | | | | | | IN/4TH. |
| 12. | | | | | | COPY DETACHED FOR OC-REGISTRY |
| 13. | | | | | | |
| 14. | | | | | | |
| 15. OC-O | | | | | | |

FORM 1 MAY 54 51-10 PREVIOUS EDITIONS MAY BE USED

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(40)

## GENERAL DESCRIPTION

The "Saberu" is a small three tube Soviet made transceiver constructed on an aluminum chassis and faceplate, and encased in a wooden container. This container in turn comes packed, along with spare parts box, antenna wire, headset and key, in a grey or brown fabric carrying bag. The set is powered by a battery pack which is carried seperately.

Multiple switching allows two of the three tubes to serve dual functions (I.E. they are used in both the transmitting and receiving circuits).

## TECHNICAL SPECIFICATIONS

A. Transmitter:

1. Frequency range: 2.7-6.2 megacycles in two bands.

2. Frequency control: Either VFO or crystal control.

3. Mode of emission: CW Morse (A1)

4. Power input: (no load on final)
   240 volts D.C. @ 10 milliamperes
   180 volts D.C. @ 21 milliamperes
   2-4.5 volts D.C. (185 milliamperes @ 4.5 volts)

5. Break in operation: Not possible with this set.

6. Calibration: The dial is calibrated from 0-100, a tuning chart being used to find the proper dial setting for a given frequency.

B. Receiver:

1. Frequency range: 2.2-7.4 megacycles in two bands.

2. Frequency control: Continuous tuning, COARSE and fine tuning controls on concentric shafts.

3. Mode of reception: Amplitude modulated or CW Morse signals.

4. Power input: 120 volts D.C. @ 10 milliamperes.
   2-4.5 volts D.C. (225 milliamperes @ 4.5 volts)

5. Calibration: The dial is calibrated from 0-100, a tuning chart being used to find the approx. dial setting for a given frequency.

## CIRCUIT DESCRIPTION

**A. TRANSMITTER:** The transmitter of this set is of the MOPA variety with the oscillator being a form of UltraAudion-Pierce which can be operated either VFO or Crystal Control. Capacitor $C_{3a}$, which is ganged to the final tank capacitor $C_{3b}$, controls the frequency of the oscillator on VFO. In parallel with $C_{3a}$ is trimmer capacitor $C_{15}$. Rotation of the tuning capacitor shaft past the 0 or 100 mark on band one (high band) causes $SW_3$ to close, placing $C_{13}$ and $C_{14}$ in parallel with the tank, thereby changing the oscillator to band two (low band). In other words, the tuning shaft can be rotated thru a full 360 degrees, 180 degrees being for band one and the remaining 180 degrees for band two.

The RF voltage developed across the oscillator tank is impressed thru capacitor $C_{28}$ upon the grid input $RFC_6$ $R_8$ of power amplifier tube $V_3$. The plate circuit load of $V_3$ consists of the tank $L_5$ $C_{3b}$, paralleled by trimming capacity $C_{24}$ $C_{25}$. The introduction of the parallel trimming capacitors $C_{22}$ $C_{23}$, thru switch $SW_4$, changes the final tank to the low band. $SW_3$ and $SW_4$ are actuated simultaneously and at the proper instant by cams on the shaft of ganged tuning capacitors $C_{3a}$ $C_{3b}$.

The antenna matching circuit is inductively coupled to the final tank via $L_9$. The matching circuit consists of inductor $L_6$, Variometer $L_1$ and capacitor $C_{27}$. The amount of inductance introduced into the $A_3$ leg of the antenna can be varied by the tuning of $L_1$. Inductor $L_6$ is shorted out of the circuit by switch $SW_5$ during 180 degrees of rotation of $L_1$, $SW_5$ being operated by a cam on the tuning shaft of $L_1$. The other leg of the antenna is connected to either the $A_1$ or $A_2$ jack, depending on the frequency of operation. When in the $A_2$ jack, capacitor $C_{27}$ is introduced into that leg of the antenna.

**B. RECEIVER:** When receiving, one leg of the antenna should be connected to jack $A_1$. The signals induced in the antenna are impressed thru capacitor $C_{26}$ upon the untuned grid input $R_3$ $R_4$ of RF amplifier tube $V_2$. Bias for $V_2$ is obtained across $R_{10}$ in the B- power lead.

The RF output of $V_2$ is developed across the plate load $RFC_3$ and is impressed, thru capacitor $C_6$, upon the grid circuit of Regenerative detector tube $V_1$. The receiver is tuned by varying capacitor $C_1$, regeneration being controlled by capacitor $C_2$. Changing to the high band is accomplished by closing switch $SW_2$, thereby shorting out part of the secondary of transformer $T_1$.

The audio signal in the plate circuit of $V_1$ is developed across iron core choke $L_3$, and is impressed thru $C_7$, upon the grid input

CIRCUIT DESCRIPTION (CONT')

$R_8$ $R_9$ of audio amplifier tube $V_3$. Bias voltage for $V_3$ is obtained across $R_{10}$ $R_{11}$ in the B- power lead. The AF output of $V_3$ is developed across a set of high impedance headphones connected in its plate circuit.

C. ANTENNA: The antenna arrangement shown in fig.4 was described to the writter as being the proper antenna for this set. The table in fig.5 shows the prescribed length of each leg of the antenna for specified frequency ranges.

By adding varying amounts of inductance to the $AL_2$ leg and capacitance to the AL1 leg, the antenna can be fed at the proper electrical point for impedance matching to the final tank. The inductance is varied by means of $L_1$ and $L_6$ while the capacitance can be varied by either using or bypassing C27.

D. POWER SUPPLY: The original power supply was described to the writter as being a battery pack composed of four Russian made units whose combined weight was 3kg. (6.6 lb.)

The adaption of U.S. batteries was necessary for the contacts and tests as the original batteries were not available. It was found that two Army BA-70 batteries properly connected (fig.1) would serve the purpose quite well. NOTE: To simplify the adaption of the BA-70s, 150 volts was used in place of the 120 volts of the original Russian batteries.

E. METERING AND TUNING INDICATORS: The front panel meter measures the filiment voltage on both the Transmit and Receive positions of SW1. Front panel rheostat $R_2$ should be adjusted to give a meter reading of two volts. Pressing the button located in the lower right hand corner of the meter actuates switch $SW_7$, thereby changing the meter range to 0-300 volts for measuring the 180 volt supply when on Transmit and the 120 volt supply when on Receive.

Tuning Indicator bulb $LMP_1$, located in the upper right hand corner of the front panel, is normally connected to pick-up loop $L_7$ which is inductively coupled to final tank coil $L_5$. In this position it gives an indication of the amount of RF energy present in the final tank. Actuating switch $SW_6$ changes the indicator bulb to pick-up loop $L_8$ on variometer $L_1$, thus giving an indication of the amount of RF current flowing in the antenna.

GENERAL DATA

A. TUBE LINE-UP: $V_1$ (Detector) 2K 2M
$V_2$ (Oscillator-RF Amp.) 2K 2M
$V_3$ (RF-Audio Power Amp.) 2N 4M (Believed to be equivalent of 3Q5)

B. POWER SUPPLY VOLTAGES: (Original batteries)

| | |
|---|---|
| "A" supply | 3 volts |
| "$B_1$" supply | 120 volts |
| "$B_2$" supply | 180 volts |
| "$B_3$" supply | 240 volts |

C. BAND RANGES:

| | | |
|---|---|---|
| Transmitter | band#1 | 3.4-6.2 megacycles |
| | band#2 | 2.7-3.6 megacycles |
| Receiver | band#1 | 4.0-7.4 megacycles |
| | band#2 | 2.2-4.1 megacycles |

D. CHASSIS: The chassis is isolated from B- by capacitor $C_{10}$ and can be grounded by means of a front panel jack.

E. SHIELDING: A small aluminum shield seperates detector tube $V_1$ from the other two tubes, this shield being mounted on the wooden case and connected to the chassis via the chassis mounting screws. The interior of the wooden case surrounding the detector is covered with aluminum foil, which is also connected to the chassis thru the chassis mounting screws.

Tube type 2K 2M has its outer glass surface covered with a metalic coating which is connected internally to pin #1 of the tube base.

F. MODEL VARIATIONS: Some models of this set have switch $SW_2$ actuated by a cam on the receiver tuning shaft. The only other change noted was merely superficial, being the relocation of the markings of the front panel controls.

## TUNING

A. TRANSMITTER:

VFO

1. Consult Tuning Chart (fig.6) to find the proper band and dial settings of $C_{3a}$ $C_{3b}$ for the desired frequency of operation. Set dial as indicated.
2. Move switch $SW_1$ to "Transmit" position (right).
3. Close the key and tune loading control $L_1$ for a dip in the brightness of Tuning Indicator lamp $LMP_1$.
4. Release the key and depress switch button on $SW_6$. While holding down $SW_6$ readjust $L_1$, this time for maximum brightness of $LMP_1$.

The set is now ready for operation

Crystal Control

Replace the above steps 1 and 2 with the following:

1a. Consult the Tuning Chart to find the approximate dial setting of $C_{3a}$ $C_{3b}$ for the frequency of the crystal in use. Set dial as indicated and insert crystal in crystal jacks.
2a. Move switch $SW_1$ to "Transmit" position, close key, and adjust $C_{3a}$ $C_{3b}$ for maximum brightness of Tuning Indicator lamp $LMP_1$.

Steps 3 and 4 are the same as for VFO operation.

B. RECEIVER:

1. The $AL_1$ leg of the antenna should be in the A1 jack for receiving.
2. Refer to the Receiver Tuning Chart (fig.7) to find the proper band switch position and approximate dial setting for the desired frequency. Set as indicated.
3. Move switch $SW_1$ to the"Receive" position (left) and adjust the Regeneration control $C_2$ for maximum "rushing" sound in the headphones.
4. Tune around with the Fine Tuning control of $C_1$ until the desired signal is heard.
5. Once the signal is found, readjust Regeneration control $C_2$ for maximum signal strength.

FIELD COMMENTS

The transmitter appeared to be quite good, consistent QRK 5 reports being received from enemy agent base station. Due to certain factors it became desirable on several occasions to decrease our signal output, at which time the antenna matching network was completely detuned. Despite this, base still reported QRK 3-4. The transmitter is very easy to tune and operate.

The receiver seemed rather good considering the type of circuitry used. As is usual with this type of detector, regeneration control settings were quite critical. The receiver Fine Tuning control is excellently geared, making for good mechanical band spreading. There is no volume control as such, however the filiment voltage rheostat $R_2$ can be used to reduce the volume on strong signals. This adjustment in turn necessitates the resetting of Tuning and Regeneration controls. The regenerative signal generated within the detector was found to radiate quite strongly despite the antenna isolating affects of the RF amplifier.

The radiator of this set appears to be an antenna-counterpoise arrangement, set up in the shape of a V. The antenna used on the actual contacts was of the proper length as shown in fig.5 but varied slightly in configuration from the ideal type described by the agent (fig.4). about 30% of its length was indoors, part of this being over metal window frames etc., the angle was approximately 60 degrees, and both ends were only about eight ft. off the ground. Despite this rather poor arrangement, excellant results were achieved as stated previously.

No actual battery life tests were made, however the BA70s which were used held up very well.

FIG.1
BATTERY CONNECTIONS
(BA-70s)

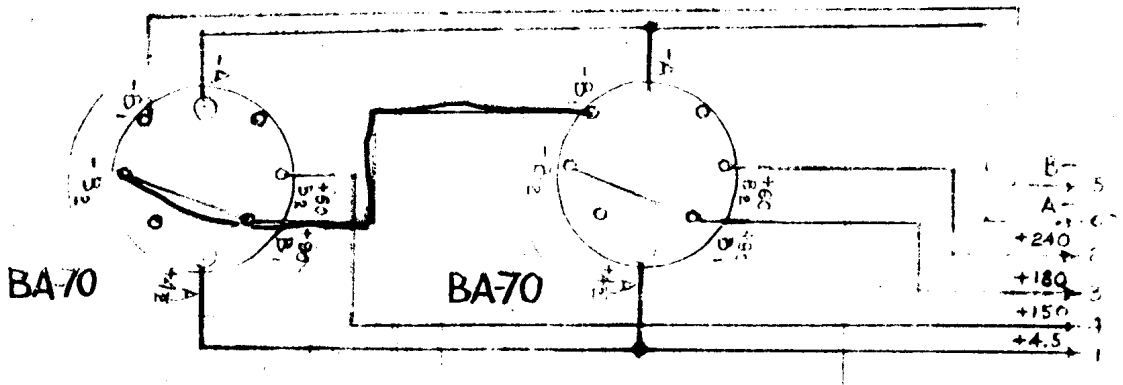



FIG.2
BLOCK DIAGRAM

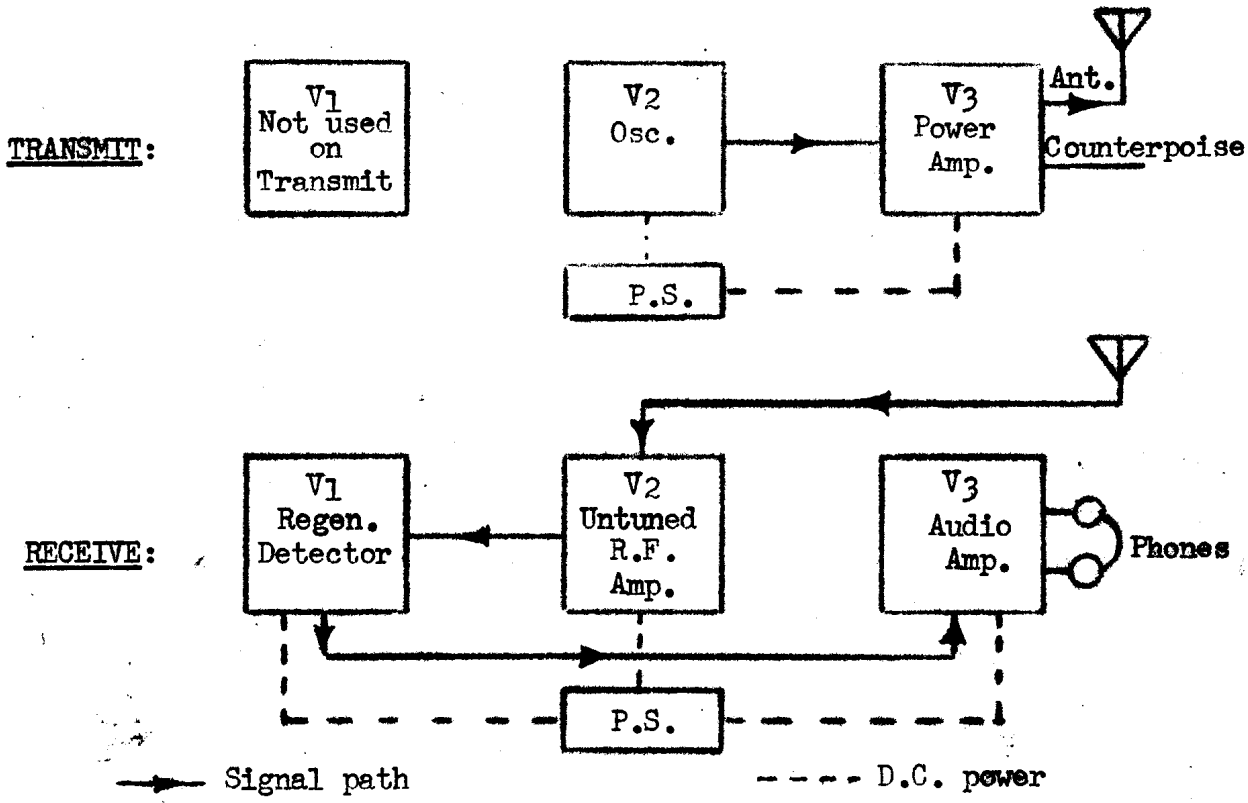
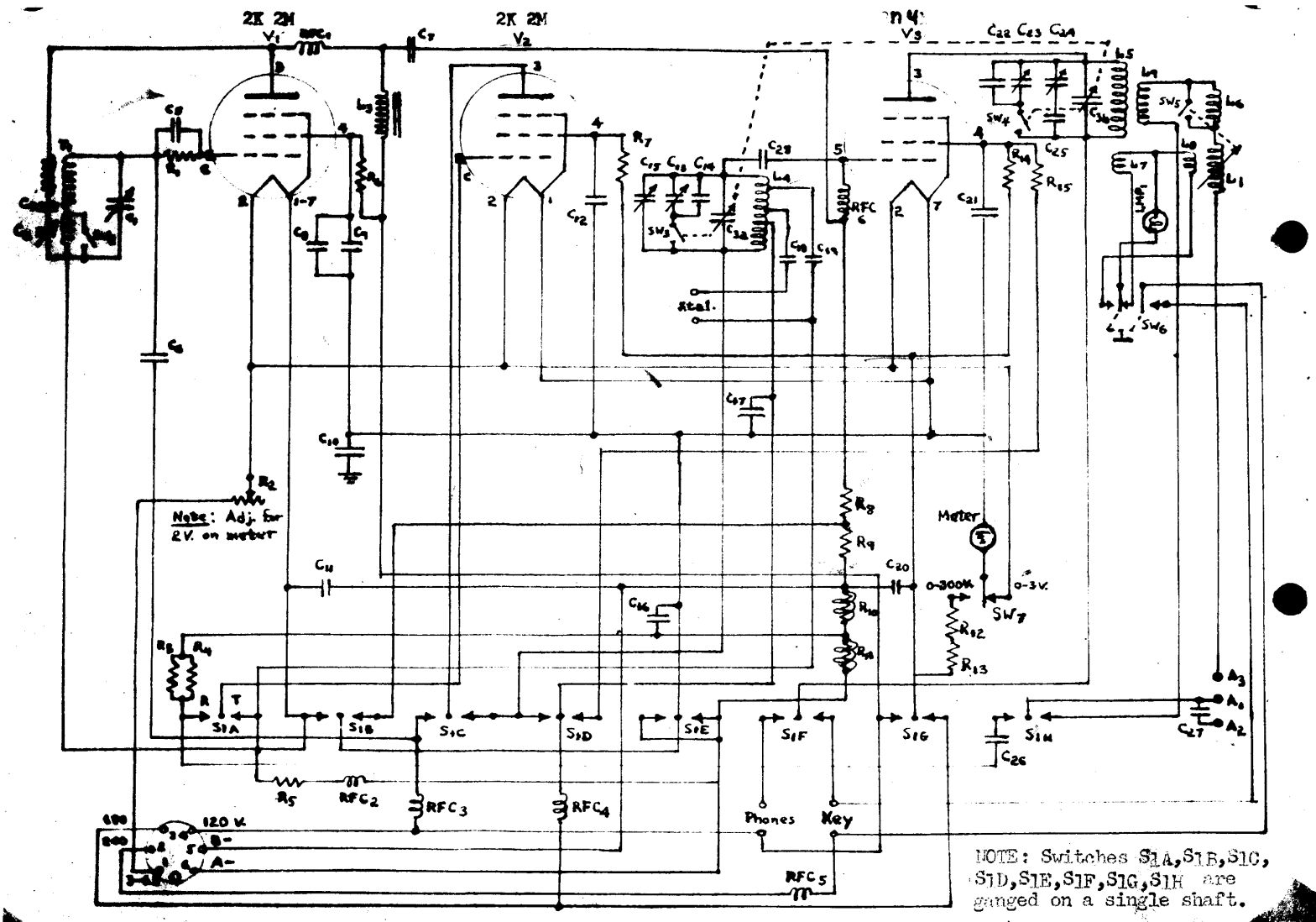


FIG. 3



ANTENNA ARRANGEMENT

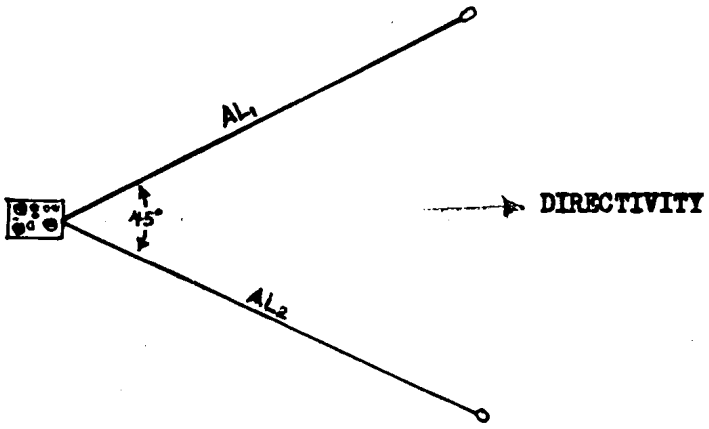
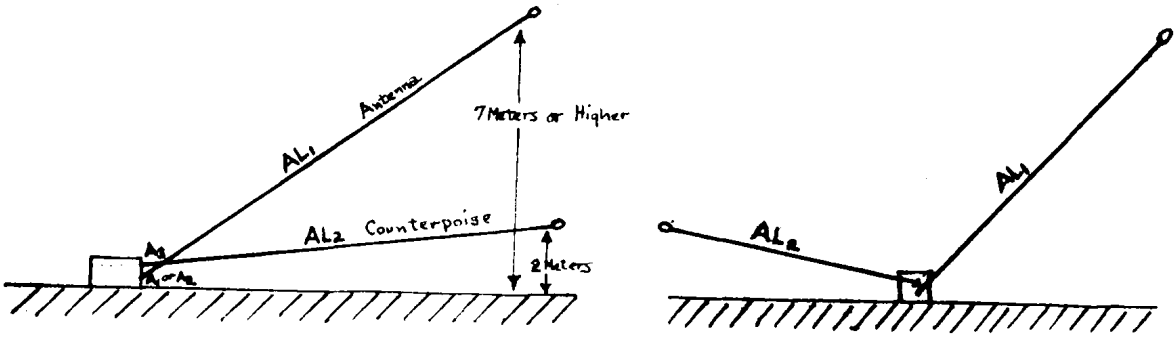



FIG. 4




ANTENNA CHART

| FREQ. RANGE IN MC. | ANTENNA ($AL_1$) | | COUNTERPOISE ($AL_2$) | |
|---|---|---|---|---|
| | JACK | LENGTH | JACK | LENGTH |
| 2.7-4.0 | $A_1$ | 24 METER | $A_3$ | 12 METER |
| 4.0-4.8 | $A_2$ | 24 METER | " | " " |
| 4.8-6.2 | $A_2$ | 12 METER | " | " " |

FIG. 5

FIG. 6

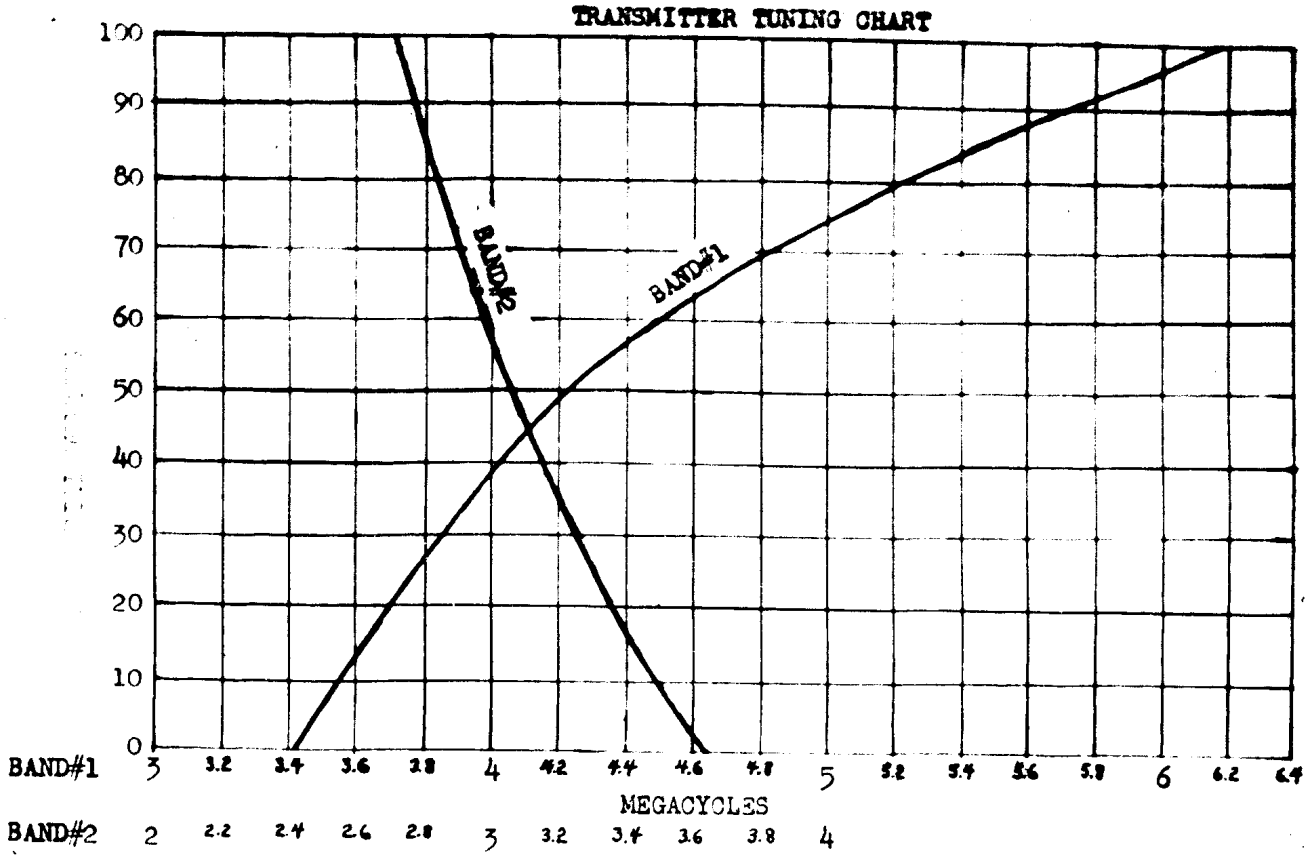



FIG. 7

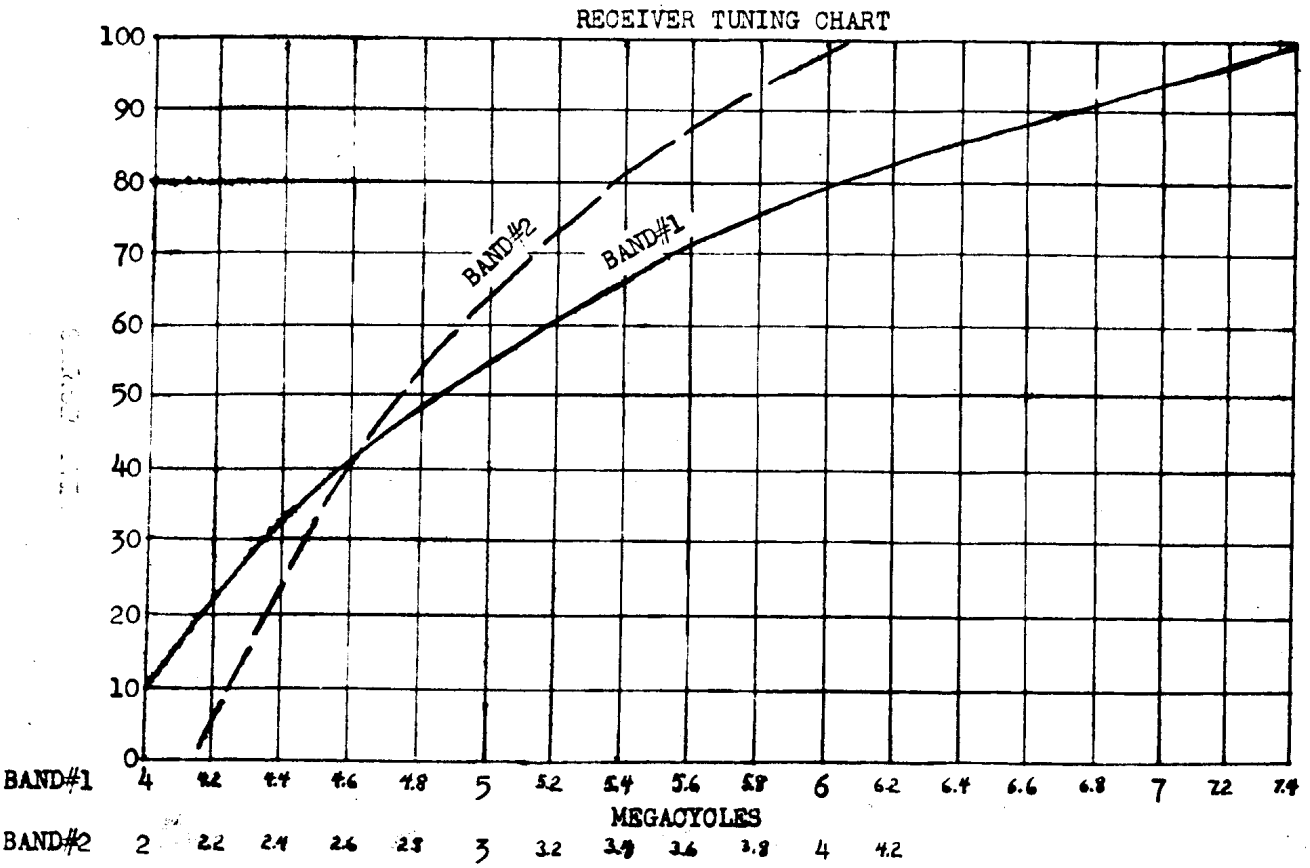
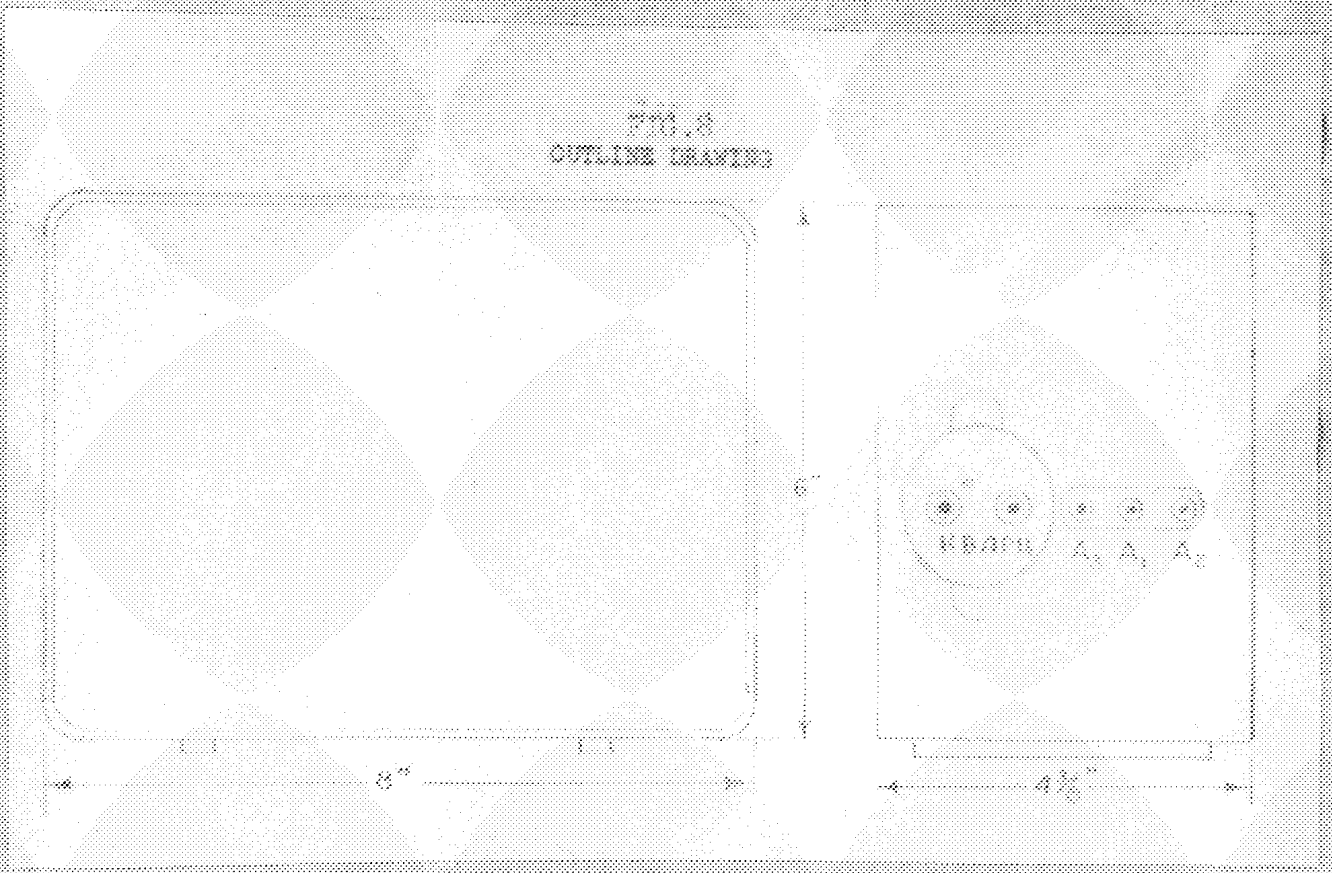
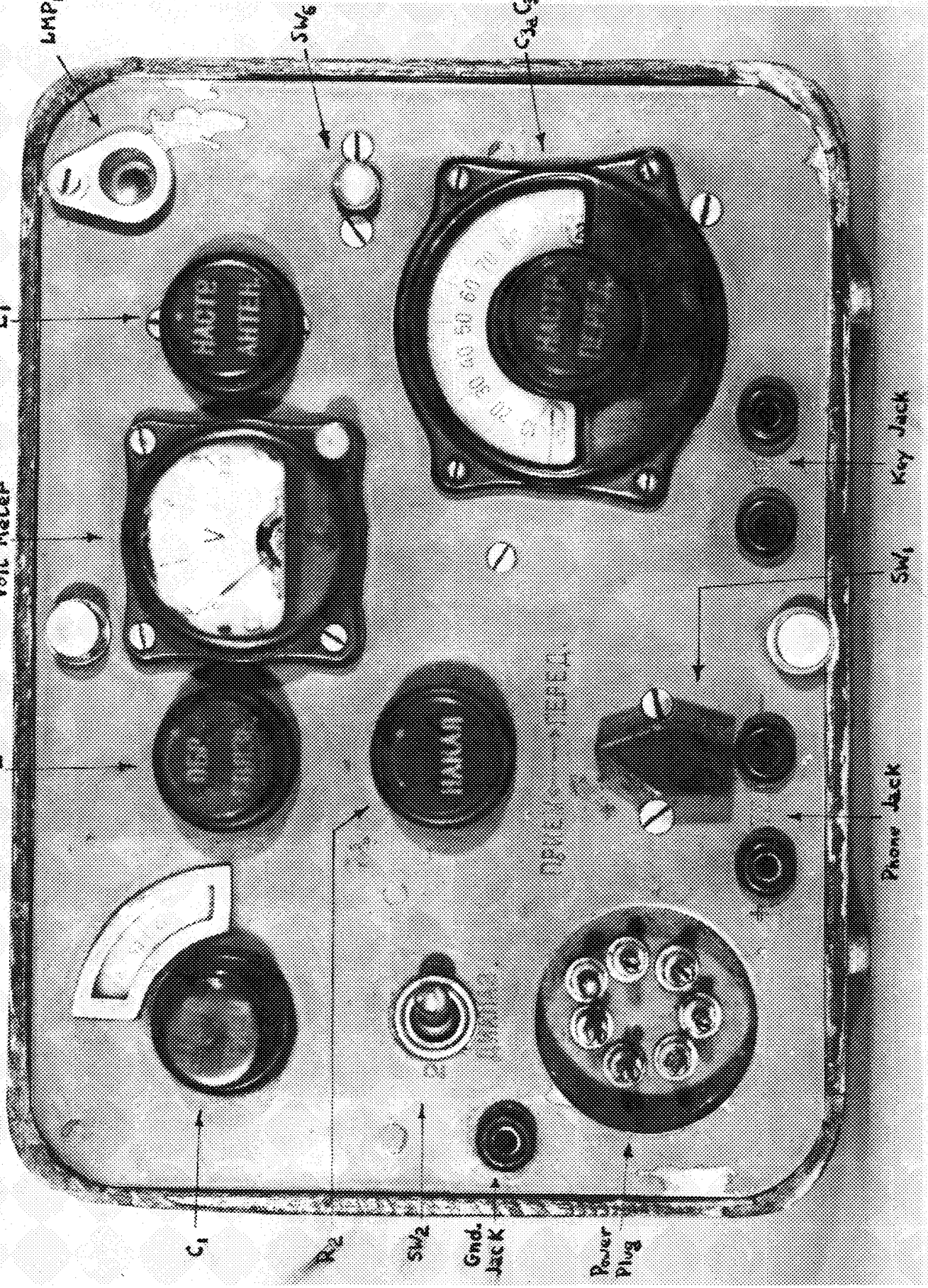


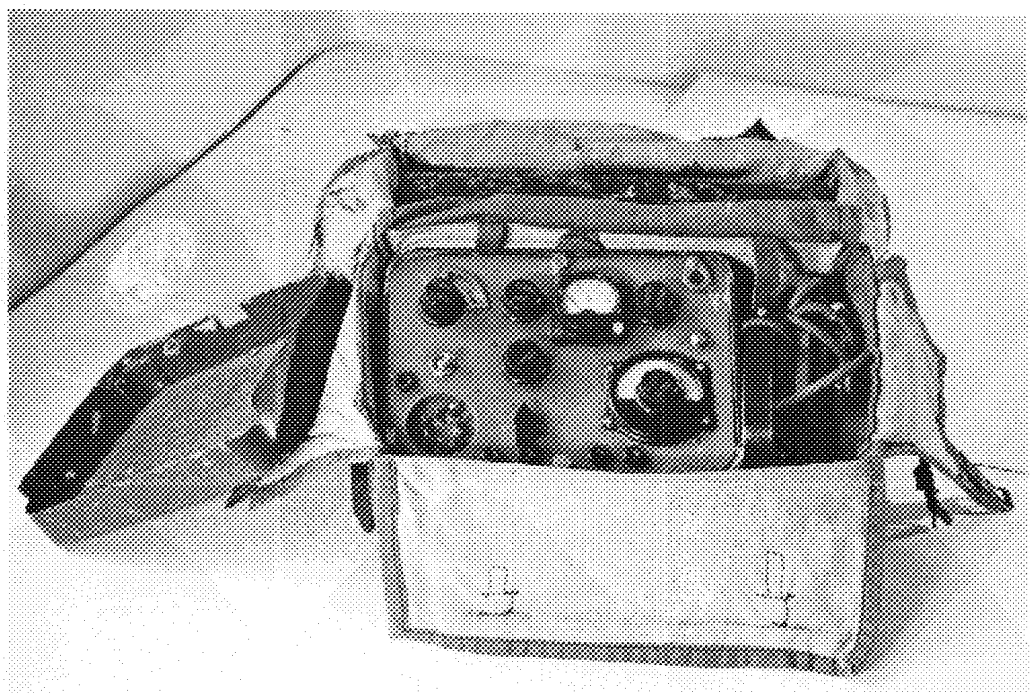
FIG. 6
OUTLINE DRAWING



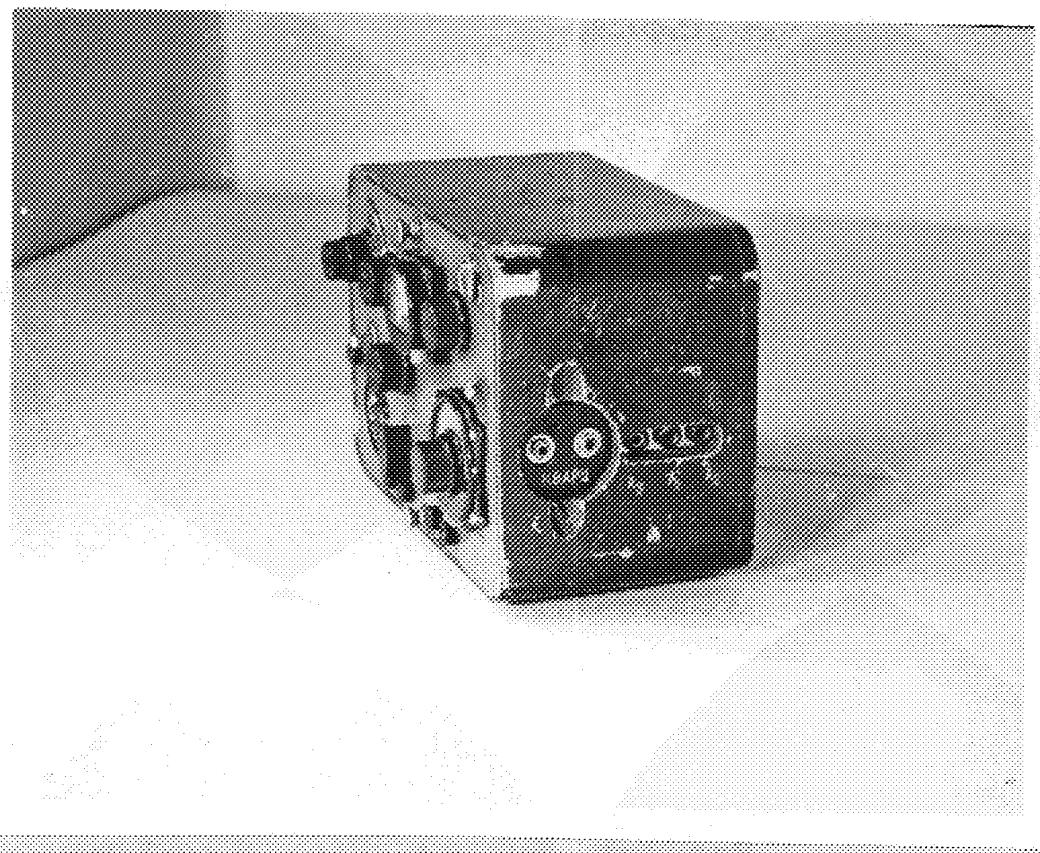


Set packed in carrying bag

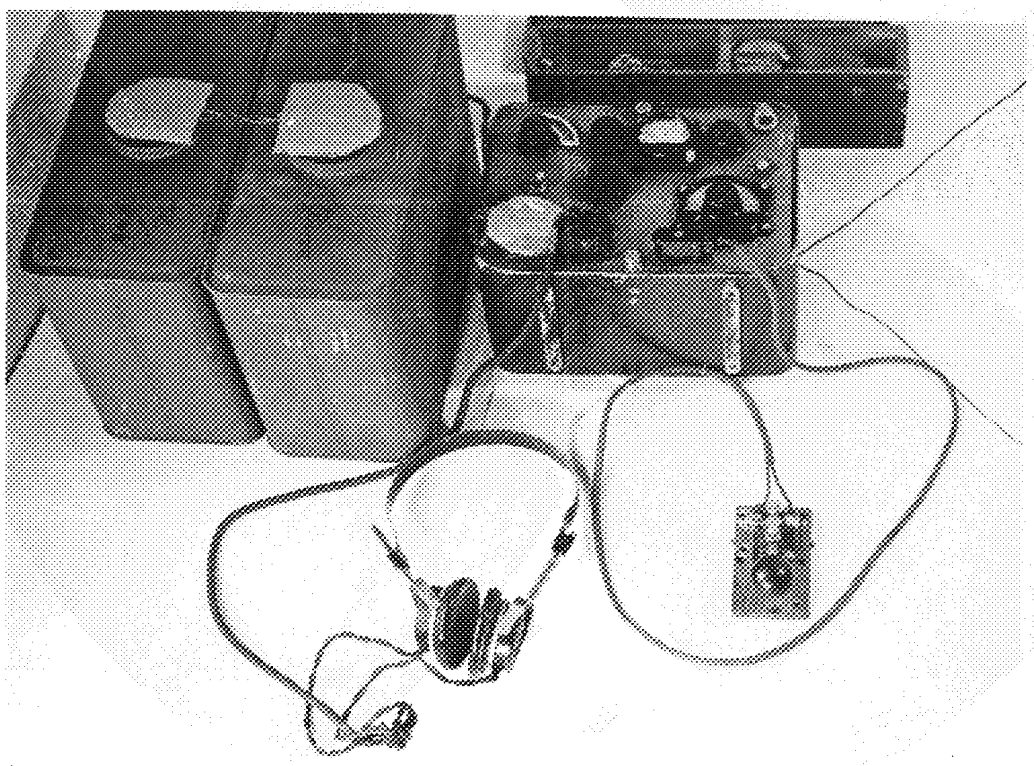
Carrying bag opened



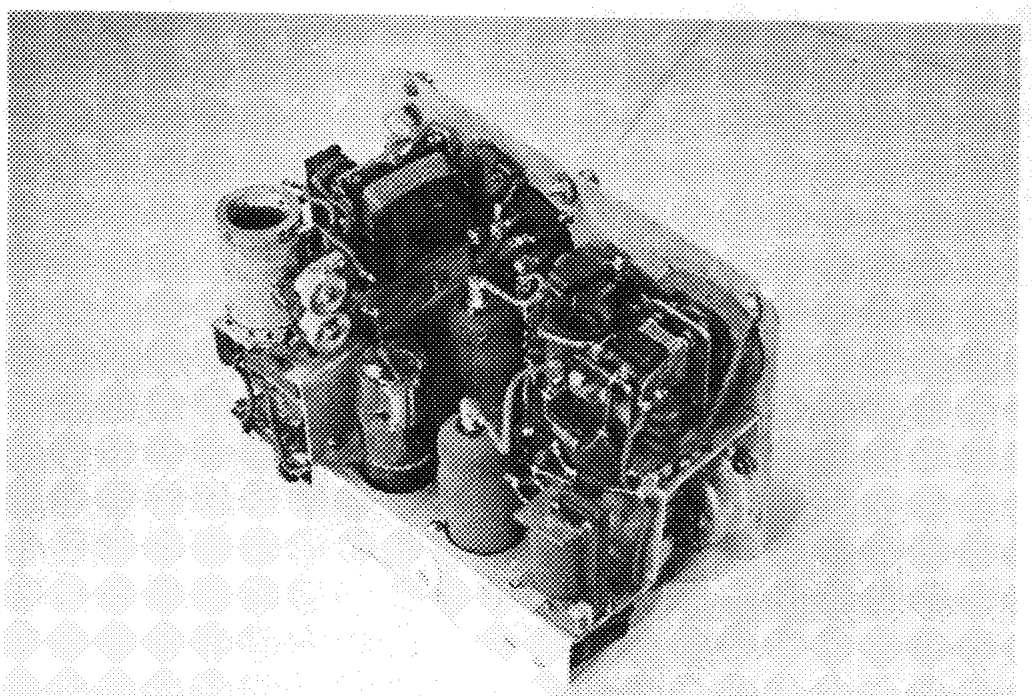
Oblique view of set showing Antenna and Crystal jacks

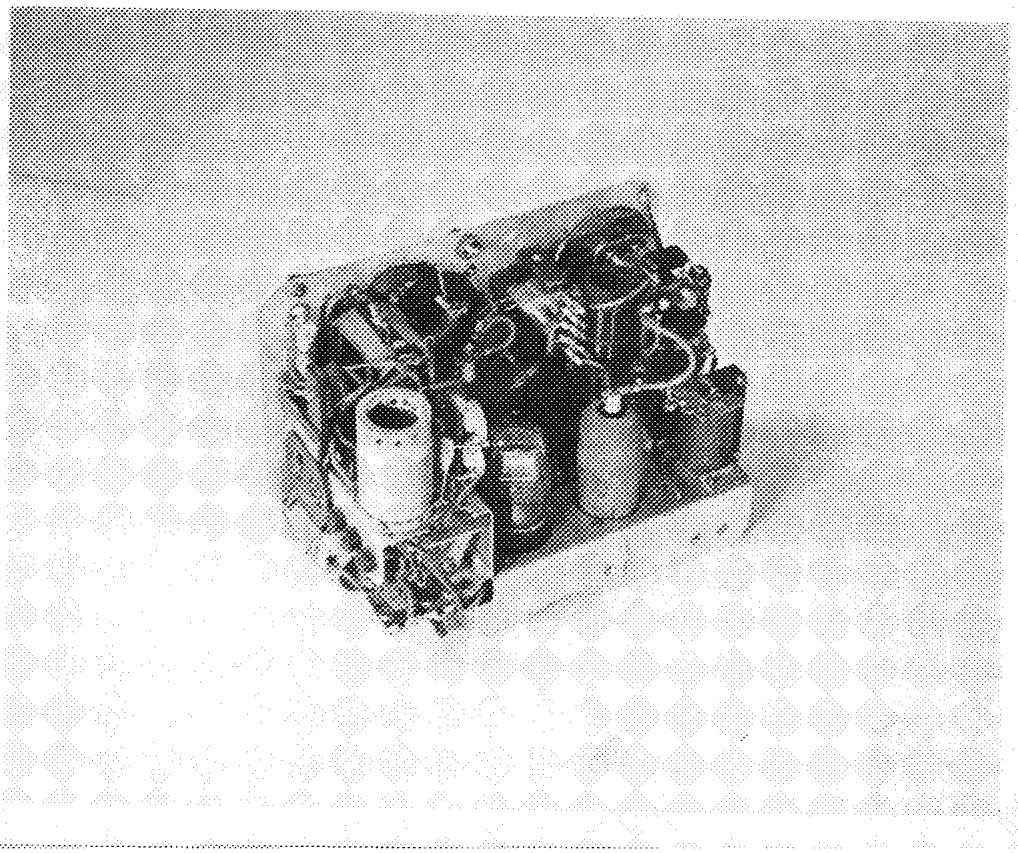


Station Arrangement



Top-chassis view





Under-chassis views